

09/831279

WO 00/28174

2/PRTS

PCT/FI99/00934

1

JC08 Rec'd PCT/PTO 09 MAY 2007

SPACE STRUCTURE AND A METHOD FOR PRESENTING THEREIN  
ESPECIALLY THE COLD SEASON

Ins  
H

The present invention relates to a spatial structure arranged especially for the spending of leisure, said space having wall and, correspondingly, roof structures defining one or several interior spaces separated from open-air. The present invention further relates to a method for presenting and/or for the realization of different climatic, especially winter activities in spaces separated from open-air and defined by essentially closed structures.

Greenhouses and the like spaces are known, which spaces are separated from open-air and where, within a cut-off of temperature minimums and especially an artificially achieved rise of temperature, it is possible to grow also such plants which at the latitudes in question would not survive on their own, due to alternations in the open-air temperature. Such greenhouses are usually intended for producing plants or parts of plants to be eaten or sensed in some way or in certain circumstances to promote scientific functions. One also knows zoological gardens usually having sheds for selected kinds of animals arranged so that the animals at least during some seasons and especially during the cold seasons obtain shelter against the climate.

Partially refrigerated spaces such as artificial ice tracks for skating, where certain winter sport activities can be practiced regardless of the outdoor temperature are also known. For similar purposes essentially horizontal ski tracks have been developed which are furnished with artificial snow. Deep frozen spaces used for the storage especially of food stuff in such a low temperature that the natural biological degradation is slowed down or completely prevented are also known.

09831279-060701

In connection with sporting facilities it has earlier been proposed to combine artificial ice tracks with heated, possibly roofed, winter football fields, so that the waste heat produced by the freezing plant could be utilized for the heating of the football field lawn using an underground heating system.

The aforesaid space arrangements having a controlled temperature are each individually intended for some rather limited activity. Thus, until now there has existed no overall space arrangement based on natural activities or functions in accordance with the different seasons of the year and where the seasons of earth and especially its northern regions could be presented at a latitude and a time of choice and in an environment as natural as possibly.

In order to amend the above described deficiency the present invention discloses a solution as described in the appended claims. Thus, the spatial structure according to the present invention is characterized in that several such at least partially closed separate spaces are arranged within an essentially unitary interior space or in immediate connection thereto, wherein the climate in each of said separate spaces can be separately regulated in accordance with mutually differing conditions. Again, the method according to the present invention is characterized by regulating the temperature of separate essentially closed individual spaces, which spaces are arranged suitably in a common interior space or immediately in connection thereto, individually to correspond to a certain climate, especially a season of the year, so that activities and functions corresponding to the respective climate conditions are brought to accomplishment in a space presenting the mean temperature of the respective climate.

The invention will now be described by way of example with reference to the appended schematic drawings, wherein:

09031279-060701  
T02090-62TE860

Figure 1 discloses a plan drawing of a solution according to one embodiment of the present invention,

Figure 2 as a sectional view discloses the embodiment of Figure 1 as seen from the side,

Figure 3 as a perspective view discloses the embodiment of Figure 1, and

Figure 4 discloses a possible detail of one separate space.

The embodiment of Figure 1 comprises two for architectural reasons circular structures 1, 1a which define a common interior space. Said structures comprise a wall/roofing structure 2, 3 which suitably is heat insulated or which in some other manner at least to some extent balances the temperature impact of the ambient climate. Said structures are arranged, in the embodiment disclosed, as two main cupolas, as evident especially from Figure 3. Of course, this outer structure 2, 3 can also be accomplished in any other shape, e.g. as a pyramid, as a conventional parallelepiped or as an arbitrary multi-shaped structure. The cupola or corresponding structure is favorably made of glass or the like material which at least to some extent is permeable to sun light so that the light and/or darkness of the ambient outdoor space can be utilized also in the interior space.

In the embodiment disclosed the implementation of a main cupola structure 1a generally corresponds to an ice stadium or a corresponding hall known per se and arranged for sports or the like activities, i.e. it comprises a central suitably refrigerated field 4, e.g. an artificial ice track known per se, including a stand 5 also known per se. This space can be utilized e.g. for sports activities, concerts, dance performances, shows or the like activities. In this cupola structure essentially warm climate conditions prevail, but the structure logically and functionally connects to a second main

09831279-060701

cupola 1 in accordance with the basic inventive idea, wherein the general climate as such might be even considerably colder.

According to the invention several separate spaces 7 to 10, 12 to 14 or groups of separate spaces 11, 15, 16 are located in an interior space 6 defined by said main cupola 1. In accordance with the present invention the temperature in each of such separate spaces can be separately regulated in accordance with the desired activity or function.

One or favorably several machineries known per se (not disclosed in the drawings) working in accordance with the heat pump principles or in a corresponding manner are arranged, for the regulation of the temperature, in a service space 22, 22a connected favorably to each of said main cupolas 1, 1a, suitably located under the cupola. These machinery(ies) is(are) used to refrigerate those spaces which are to be colder than the other ones. The excess heat generated in the refrigeration of the cold spaces is favorably utilized for heating spaces 5, 9 which are warmer than other spaces. Favorably, a machinery for works of ice art suitable in an arctic landscape is also arranged in said service space, as well as other machinery and equipment necessary for the function of the arrangement. Said service spaces also suitably comprise spaces, means and equipment for the production and maintenance of snow sculptures or the like.

In the disclosed embodiment spaces for reception, ticket sale 26 as well as certain restaurant space 27 are arranged between said main cupolas 1, 1a, said spaces thus serving both main cupolas. Also the temperature regulating machinery favorably serves both spaces either as such or via separate heat transporting units. In the disclosed embodiment both main cupolas further are surrounded by a ski/slalom and/or sledge slope 23 with artificial snow which also favorably is accomplished by said machineries. Said slope 23 encircles the cupola structures 1, 1a favorably so that it ends below the

09831279-060701

level of the service spaces 22 at a level 24 from which a lift 25 takes the users back up to the top of the slope 23. In this manner, for cupolas 1, 1a having a height of e.g. about 40 meters and a corresponding diameter of about 70 meters, a slope 23 is achieved which has a length of about 500 meters. Accomplished in this scale the stand arranged in the cupola 1a will hold 2000 to 5000 persons.

According to the present invention separate spaces or groups of separate spaces are arranged in the suitably cold main cupola 1, the temperature in each individual space being regulated by a suitable refrigeration and/or heating equipment known per se. Thus, a "garden of the four seasons" arranged in the main cupola 1 represents one of the most typical space entities in accordance with the present invention. Said garden comprises suitably four separate spaces defined by at least partially transparent walls, wherein a space 7 may exhibit a typical Nordic or Arctic winter scenery where winter conditions and a corresponding temperature is thus arranged. Especially in order to provide winter conditions a winter scenery arrangement in accordance with US-Patent No. 5,407,392 by the same inventor is favorably arranged in the space. Said arrangement provides, by means of a refrigerating machinery and the introduction of water vapor, ice formations representing winter conditions, which formations may be either separately provided objects of art or e.g. natural trees and structures covered with rime frost. The space further may comprise natural plants and animals capable of enduring the winter and/or imitations thereof. Favorably, sound and light effects showing the season disclosed in a space is arranged in the corresponding space, i.e. the wind whistling and the animals howling in the winter, the murmur of trees, illumination representing the darkness of the polar night and Norther lights effects accomplished favorably by a light cable arrangement etc.

Correspondingly, the space 8 succeeding the winter scenery

09831279.060701

favorably corresponds to the Nordic spring. Favorably, this space too comprises the same apparatus i.e. temperature regulating and other apparatus, which apparatus transform the conditions prevailing in the space to correspond to the desired season. In a corresponding manner spaces 9 and 10 may comprise sceneries and conditions presenting summer and autumn, respectively. Of said spaces the one 9 representing e.g. summer can, in practice, be accomplished with such a temperature which actually discloses a tropical summer with genuine tropical plants and animals. On the other hand, by choosing an essentially similar apparatus for each space 7 to 10 and by selecting the natural plants and possibly animals utilized such an arrangement can also be implemented wherein the conditions in said spaces 7 to 10 actually continuously change in a manner which corresponds to the natural change of seasons or, for example, at a faster rhythm than the natural one, where plants accustomed to Northern conditions will thrive in the same manner as in nature. Also in these spaces sound and light effects suitable for the season are implemented, like the songs of birds, sunlight penetrating the leafage of a rain forest, etc.

A garden arrangement showing the seasons of the year, as disclosed above, can be implemented as separate structures comprising one or several transparent walls, and/or especially favorably so that a door leads thereto from the surrounding space and/or from an adjacent space, which door constitutes an entrance into the space so that one suitably can pass from one space to another. According to some favorable embodiments of the present invention the general concept can comprise, in addition to or replacing the season gardens disclosed, also other space arrangements implemented either separately or within one main cupola 1. Thus, e.g. an arctic sauna entity 11 is favorably linked to the structure. Such a sauna entity suitably comprises separate bathing spaces arranged under cupolas or such like arranged within the main space 6, said bathing spaces having warm and cold pools e.g. in a manner

09831279-060701

more closely discussed below. Here a cold pool 14 may comprise an ice cover made by a refrigeration machinery, said ice cover having a hole in the ice for winter swimming. The same pool 14 can also serve a winter fishing arrangement so that the pool contains fish to be caught from under the ice cover using e.g. ice angler's jigs, said fish being either especially brought into the pool or bred therein.

Especially favorably said sauna entity 11 comprises a common separate space 11a covering several smaller separate spaces 12, 12a, 12b, 12c, 12e, said common space suitably being arranged within the main space 6 and as such surrounding said separate spaces 12, 12a, 12b etc. arranged for different functions. Thus, an entity is implemented in practice, which comprises several nested structural layers wherein the space 6, 6a between each of every respective two structural layers 1-11a, 11a-12 etc. can be separately climate conditioned in accordance with the principles set forth in the present application.

Correspondingly, the climate in each of the innermost separate spaces 12, 12a, 12b etc. can be changed as desired in a manner which differs from the one in an adjacent or surrounding space. Thus, the sauna entity 11 disclosed in Figure 1 comprises a central steam room 12 which suitably is arranged in an intermediate cupola 11a and around which steam room, besides said earlier disclosed ice cold pool 14a arranged in said separate space 12a, also a warm pool is arranged in a further separate space 12b.

The climate in said separate space 12b can further, either as an entity or to separate, in certain cases separately refrigerated structures, be so cold that the water steaming from the warm pool will form rime frost on the structures of the space 12b and thus constitute a beautiful natural decoration. Besides these cold separate spaces 12a, 12b an entirely warm space 12c for e.g. children may be arranged in said space 11a,

09831279-060701

said warm space comprising a warm pool and possibly imitations of frosted structures and plants and/or plants and other decorations adapted for a warm space. A separate snow bath space 12d can further be connected to said sauna space 12, said snow bath space comprising artificial snow where it is possible to tumble or roll around in connection with the sauna bathing.

Said separate spaces 12, 12a, 12b, 12c and 12d arranged favorably in an intermediate space 11a are favorably mutually interconnected by suitably transparent corridors 11b. In the same manner a connection is arranged to dressing rooms 11c arranged suitably in the vicinity of the circumference of the intermediate space 11a, as well as, for example, to a separate space 12e comprising an ice bar. This space 12e can also be arranged partially outside the wall/roof structure defining said intermediate space 11a as disclosed in the Figure.

The general arrangement can further comprise an arctic zoo 13, an arctic fishing and diving pool 14 as disclosed above, as well as suitably other separate spaces for such leisure, hobby or sports activities as can be adapted to a winter landscape. In a corresponding manner e.g. snow churches 15, 15a, 15b for one or suitably different religious groups can be arranged in the common space 6 defined by the common main cupola 1, for weddings or similar occasions. The space also favorably comprises a snow hotel with igloo type accommodation spaces 16, 16a, 16b, in connection to which favorably spaces for washing and similar utilities are arranged for each accommodation space. These washing spaces can favorably be used also as dressing rooms for people visiting the structure, giving opportunity to change into appropriate dress in accordance with the conditions prevailing in each of the separate spaces.

In the disclosed embodiment an artificial iceberg 17 is further arranged centrally in the interior space 6 generally disclosing arctic conditions, said iceberg being arranged

09831279-060701



either in its closed separate space or located freely directly in the interior space 6. In this respect Figure 4 discloses an iceberg scenery which, in accordance with one embodiment of the present invention, is confined into its own separate space by transparent walls 18. In this case there can also be animals belonging to the arctic world either as living specimen 19 or as imitations 20, suitably also as plants 21 connected to said scenery. If an iceberg 17 is arranged directly in a common interior space 6 it can, on the other hand, be utilized e.g. for climbing. The erosion of the iceberg 17 caused by the climbing activities can namely be especially easily amended by the refrigerating capacity at hand.

Above some embodiment of the present invention as well as some arrangements implementable in accordance therewith have been disclosed by way of example. For the professional it is, however, clear that the invention can be utilized also in other ways within the scope of the appended claims.

09831279-060701  
T02090-621E860